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#### METHOD OF OPERATION

Selector Circuit - Incoming From Manual Key Indicator - Panel Machine Switching System.

#### DEVELOPMENT

##### 1. PURPOSE OF CIRCUIT

- 1.1 This circuit is used in establishing connections on calls from key indicator manual offices to panel machine switching offices.

##### 2. WORKING LIMITS

- 2.1 The external circuit loop for selections shall not exceed 1550 ohms and shall not include more than 12 miles of cable. The trunk conductor loop resistance shall be compensated to 900 ohms minimum.
- 2.2 The external circuit loop resistance for supervision toward the calling subscriber shall not exceed 1400 ohms and the trunk leak resistance shall not be less than 30,000 ohms.
- 2.3 The external circuit loop resistance for supervision toward the calling subscriber shall not exceed 750 ohms when the operate test requirement for the B1 relay is .021 ampere and shall not exceed 900 ohms when the operate test requirement for the B1 relay is .019 ampere. In either case the line leak resistance shall not be less than 10,000 ohms.

#### OPERATION

##### 3. PRINCIPAL FUNCTIONS

- 3.01 Recognizes seizure.
- 3.02 Makes brush selection.
- 3.03 Trips the selected brush.
- 3.04 Makes group selection.
- 3.05 Selects and centers the multiple brushes on, the terminals of the first idle trunk.
- 3.06 Grounds the sleeve terminal of the selected trunk as soon as it is seized and maintains a ground on the sleeve terminal until the incoming

condition exists, and (e) returns to normal when released by the manual operator.

3.20 When the elevator travels to the top of the frame on a trouble condition (tell-tale) the circuit functions as follows: (a) Releases the UP magnet, (b) signals the sender as on an overflow condition. (c) recognizes trunk closure. (d) signals the operator as on overflow condition, and (e) returns to normal when released by the operator.

3.21 Provides fuse protection against excessive current.

3.22 Returns to normal if the switch is moved off normal manually.

3.23 Recognizes a wipe-out condition as soon as the switch enters the ringing position, opens the ringing circuit, and returns to normal.

#### 4. CONNECTING CIRCUITS

This circuit functions with:

4.1 Manual cords equipped with key indicator apparatus including an associated sender.

4.2 Standard final selector circuits.

4.3 Blank incoming line circuits which include a sender run-down feature.

#### DETAILED DESCRIPTION

##### 5. SEIZURE

When the trunk to an incoming selector is seized by a key indicator link circuit, and the associated sender closes the fundamental circuit for incoming brush selection, the incoming (L) and sender (STP) relays operate. The (L) relay, operated locks in the fundamental circuit and advances the switch to position 2.

##### 6. BRUSH SELECTION

In position 2 the (L) relay holds through its make contact, the (A) commutator is connected to the tip side of the fundamental circuit, and the up-magnet is energized. During the upward travel of the elevator the (A) commutator causes the operation of the sender counting relays by alternately connecting and removing ground from the tip side of the incoming trunk.

The (L) relay locks over the ring side of the selected trunk to ground in the final until all selections are completed. In position 8 the fundamental circuit is closed through to the final. When selections have been completed the final removes ground from the ring side of the trunk releasing the (L) relay. The (L) relay released, advances the switch to position 9. In position 9 the (L) relay is connected to the ring side and ground is connected to the tip side of the fundamental circuit and when the circuit is closed by the sender, the incoming (L) and the sender (STP) and (OFL) relays operate. The (L) relay operated advances the switch to position 10. The (L) relay releases when the switch advances.

11. TRUNK CLOSURE

With the sequence switch in position 10 the (A) relay is connected to the trunk, awaiting closure from the manual operator's cord circuit. With the plug of the calling cord inserted in the outgoing trunk jack, battery and ground in the cord circuit operate the incoming (A) relay through its windings in series aiding. The (A) relay, operated, operates the (CS-1) relay in turn operating the (L) relay. The (L) relay, operated, operates the (R-2) relay which locks under control of the (L) relay, and advances the switch to position 11. The (L) relay operated also operates the (R2) relay. The (R2) relay operated locks under control of the (L) relay and advances the switch to position 11. The A cam advances the switch to position 13. After the switch advances from position 10 1/2 the (L) relay holds under control of the (A) relay.

12. RINGING

Four-party lines which are served by final trunks which terminate in the 0 and 2 groups on the incoming frames require a one-ring code, and lines which are served by final trunks which terminate in the 1 and 3 groups on the incoming frame require a two-ring code. The one-ring code ringing circuit is closed in position 13 and the two-ring code ringing circuit is closed in position 15. The PU interrupter and the (P) commutator control the closing of the two-ring code ringing circuit in such a manner that both rings of the two-ring code are always given. The two parties which are signalled by the same ringing code are selected by reversing the leads from the final multiple to the line at the distributing frame.

13. If the selected trunk is in either the 0 or 2 group the (R2) relay holds in position 13 and the one-ring code ringing circuit is closed. If the selected trunk is in either the 1 or 3 group the (R2) relay is short-circuited by the (P) commutator when the switch enters position 11, causing the release of the (R2) relay. The (P) commutator also advances the switch

Z wiring is used. Ground on the armature of the operated (R2) relay advances the switch to position 15 and (with Z wiring) ground on the Z commutator advances the switch to position 16. In position 16 interrupted ground from the "Misc. Tone and Int. Ckt." operates and releases the (S) relay. Operation and release of the (S) relay alternately short circuits, and removes the short circuit from, the 1200 ohm winding of the (A) relay thereby causing alternate operation and release of the calling cord supervisory relay in the manual office. If Z wiring is not furnished the switch does not advance from position 13. In either case when the operator removes the plug from the outgoing trunk jack the (A), (CS-1) and (L) relays release advancing the switch to position 18. Return to normal is completed as described for a completed call. While the switch is advancing through positions 13 1/2/15 ground is connected to the tip overflow terminal operating the overflow register which is connected thereto.

17. TELL-TALE (T Wiring)

If the selector is driven to the top of the frame (tell-tale) in any of the up-drive positions ground on the X commutator advances the switch to position 9. The switch is advanced from position 9 to position 13 as described for "Overflow" condition. Ground on the X commutator advances the switch to position 16. Return to normal is completed as on "Overflow" condition.

18. TELL-TALE (S Wiring)

If the selector goes to tell-tale in any of the up-drive positions ground on the X commutator and on the make contact of the (L) relay advances the switch position 7, awaiting final. The switch stays in position 7 until released manually.

19. SELECTOR GROUP REGISTER

Each time the switch advances through position 13 3/4 ground is connected to the lead "to Selector Group Register", operating the register.

20. BUSY FLASH FROM FINAL (X Wiring)

When X wiring is used and the final selects a busy line interrupted battery over the tip from the final alternately operates and releases the (S-1) relay thereby alternately short-circuiting and removing the short circuit from the 12,000 ohm winding of the (A) relay. The calling cord supervisory lamp is thus caused to flash and at the same time a busy tone is inductively transmitted from the final over the tip through the repeating coil to the manual operator and calling subscriber.

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